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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/823,195	03/29/2001	Xiao-An Zhang	10010538-1	1230

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HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, CO 80527-2400

EXAMINER
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EVERHART, CARIDAD

ART UNIT	PAPER NUMBER
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2895

MAIL DATE	DELIVERY MODE
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05/29/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 09/823,195	<b>Applicant(s)</b> ZHANG ET AL.	
	<b>Examiner</b> Caridad M. Everhart	<b>Art Unit</b> 2895	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,20 and 40 is/are rejected.
- 7) ☒ Claim(s) 3-19 and 21-39 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### Response to Arguments

Applicant has argued that the examiner's arguments were one paragraph in length. This argument is respectfully found to be not persuasive because the paragraph pointed out portions of the reference which the examiner felt were relevant. With respect to applicant's argument that the examiner did not understand what the reference was stating, the examiner interpreted claim 1 to recite a molecule which responded to an electric field in one of the recited modes, and although some of the molecules described by Ellenbogen et al were, as stated in applicant's arguments, in the Background section of Ellenbogen et al, a patent is prior art for all it contains, and not only the disclosed invention(MPEP 2123(I)). Claim 1 recites "a molecular switch" and "a molecular system". Ellenbogen does disclose molecules that respond to an electric field by a change in conjugation which has a different energy level from that which the molecule had before exposure to the electric field. The molecule can function as a molecular switch, and therefore this satisfies the limitations of claim 1. Because claim 1 does not recite an assembly of parts nor how these parts are assembled together, applicant's argument that the examiner does not show how Ellenbogen assembles these passages to anticipate applicant's invention is not persuasive. The rejection shows that Ellenbogen discloses that molecular a molecular switch which has different energy levels brought about by conjugation, which is changed by the application of an electric field, as for example the portion of Ellenbogen which discusses the mechanism of the electron transfer within polyphenylene-based wire which has conjugated pi

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orbitals which have change in energy levels under the influence of an electric field. With respect to the discussion in Ellenbogen of the addition of the portions of molecules which add barriers, these portions change the energy levels and improve the switching properties of the prior art molecules. The molecules still provide the portions which have the delocalization and conjugation of the pi orbitals, and the tunneling mechanism is still provided which the electric field is applied, so that the limitations of the rejection claims are still satisfied. Ellenbogen et al disclose that the barriers do not prevent electron tunneling(col. 4, lines 47-62 and col.9, lines 1-23), and the electron tunneling provides that the electrons will still take part in the extended conjugation when an electric field is applied. The change is a change in conjugation, and also a change in conformation because the pi orbitals undergo a change in conformation. Applicant's arguments with respect to claims 3, 21, 22, and 23 have been persuasive. Applicant's arguments with respect to the anticipated of claims 20 and 40 have also been persuasive; the rejection of these claims has been rewritten on new grounds of rejection.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 2 are rejected under 35 U.S.C. 102(e) as being anticipated by Ellenbogen et al (US 6,348,700).

The reasons are as argued above and as stated in the discussion below, to which the discussion above is to be added.

Ellenbogen et al discloses forming monomolecular conductors, gates and diodes (col. 1, lines 7-10), which provide a molecular switch (col. 3, lines 60-64). The delocalization of the pi bonding orbitals results in a conduction band (col. 2, lines 62-67 and col. 3, lines 1-8) energy state. The transition of the molecular switch is provided by the pi orbital conjugation and is of the HOMO LUMO type (col. 9, lines 15-23).

As argued above, it is believed that the molecule disclosed by Ellenbogen et al satisfies the limitation of a molecular system which undergoes change of energy level in an electric field due to change in conjugation and conformation and which has field induced band gap change and pi electrons delocalized over the entire molecule as disclosed by Ellenbogen et al. (Fig. 5 and col. 2, lines 61-67 and col. 3, lines 1-7).

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 20 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ellenbogen et al as applied to claim 1 above and as argued above in the Response to Arguments..

Ellenbogen et al does not disclose explicitly the molecules in the rejection above in a device between two electrodes..

Ellenbogen et al discloses that a molecule may be placed between terminals or contacts made of a metal such as gold(col. 8, lines 65-67 and col. 9, lines 1-3).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have placed the molecules disclosed by Ellenbogen et al as being an improvement over the prior art between electrodes and applying an electric field because Ellenbogen et al disclose that this is a method for applying electric field to the molecule described in the cited passages as molecular switches (col. 5, lines 33-37), and it is clear that in order to function as molecular switches in a device the molecule would need to be connected to other devices and at least between electrodes, which would have been obvious to one of ordinary skill in the art. Implicit disclosure or inferences which one of ordinary skill in the art can make from the disclosure may be relied upon(MPEP 2144.01), and one of ordinary skill in the art would have applied the disclosure made by Ellenbogen et al to place a molecule between electrodes to the molecules disclosed by Ellenbogen et al.

***Allowable Subject Matter***

Claims 3-19, and 23-39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Richards can be reached on 571-272-1736. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Caridad Everhart/  
Primary Examiner  
AU 2895

5-26-2009